BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(CSE)-AIML-2021/B.Tech.(CSE)-AIML-2022
Course Name – Database Management Systems
Course Code - PCC-CSM501
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the suitable words to fill the blanks. Database _____ defines the logical design of the database, and the database _____ defines the snapshot of the data in the database at a given instant in time.

a) Instance, Schema
b) Relation, Schema
c) Relation, Domain
d) Schema, Instance

(ii) Select which word best express the an atomic domain.

a) Different
b) Indivisbile unit
c) Constant
d) Divisible

(iii) A relational database describes of a collection of

a) Tables
b) Fields
c) Records
d) Keys

(iv) Identify the primary function of Relational Algebra:

a) Designing user interfaces
b) Querying and manipulating relational databases
c) Data visualization
d) None of these

(v) Identify the fundamental operation in Relational Algebra:

a) SELECT
b) INSERT
c) UPDATE
d) JOIN

(vi) Identify what a tuple variable represents in Tuple Relational Calculus:

a) A data type
b) A specific data value
c) A row in a relation
d) A column in a relation

(vii) The _____ clause allows selection of only those rows in the result relation of the ____ clause that satisfy a specified predicate. Choose the correct option.

a) Where, from
b) From, select
c) Select, from
d) From, where

(viii) The primary medium for the long-term online storage of data that explains the entire database

a) Semiconductor memory
b) Magnetic disks
c) Compact disks
d) Magnetic tapes

(ix) Determine the cheapest memory device in terms of costs/ bit

a) Semiconductor memory
b) Magnetic disks
c) Compact disks
d) Magnetic tapes

(x) Consider money is transferred from (1)account-A to account-B and (2) account-B to account-A. Estimate Which of the following form a transaction?

a) Only 1
b) Only 2
c) Both 1 and 2 individually
d) Either 1 or 2

(xi) Estimate the characteristics of transactions

a) Atomicity
b) Durability
c) Isolation
d) All of these

(xii) Evaluate which of the following has "all-or-none" property?

a) Atomicity
b) Durability
c) Isolation
d) All of these

(xiii) Identify the storage structure used for fast data retrieval in a database:

a) B-Tree
b) Linked List
c) Queue
d) Stack

(xiv) Determine the term used to describe the property of a transaction that ensures it appears to be executed as a single, uninterrupted operation:

a) Serialization
b) Atomicity
c) Isolation
d) Concurrency

(xv) Compute the result of serializing two transactions, T1 and T2, in a way that ensures T2 runs after T1:

a) T1 -> T2
b) T2 -> T1
c) T1
d) T2

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Determine the importance of the ACID properties in transaction processing. (3)
3. Explain Transaction in the context of a database management system. (3)
4. Explain how B-trees are used in database indexing. (3)
5. Differentiate the concept between logical data independence and physical data independence. (3)
6. Explain a serial schedule and evaluate how does it relate to transaction processing? (3)

OR

Explain a serializable schedule and conclude why is it important for database systems? (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Discuss the challenges associated with implementing and managing locks in concurrency control. (5)
8. Identify the ER diagram to capture the requirements stated below: A company has several business units. Each business unit has multiple projects. Employees must be assigned to one (5)

business unit. One or more employees are assigned to a project, but an employee may be on vacation and not assigned to any project. One of the assigned employees will be the project manager for the project.

9. Evaluate the role of indices in database storage strategies. (5)
10. Explain the following: (5)
    a) Ternary relationship, b) Weak entity set,

    c) Grouping d) Aggregation.

11. Assess the universal relation R={ A,B,C,D,E,F,G,H,I} and the set of functional dependencies F= {(A,B)→{C],{A}→{D,E},{B}-→{F},{F}→{G,H},{D}→[I,J}.what is the key for Decompose R into 2NF,the 3NF relations. (5)
12. Explain the phenomenon of a cascading rollback in concurrency control and illustrate how does a cascading rollback occur? (5)

OR

Explain the concept of a phantom read in concurrency control and illustrate how do phantom reads occur? (5)

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